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EU Accession Countries' Specialisation Patterns in Foreign Trade and Domestic Production What can we infer for catch-up prospects?

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Abstract

This paper supplements prior analysis on ‘patterns and prospects’ (Stephan, 2003) in which prospects for the speed of future productivity growth were assessed by looking at the specialisation patterns in domestic production. This analysis adds the foreign trade sphere to the results generated in the prior analysis.

The refined results are broadly in line with the results from the original analysis, indicating the robustness of our methods applied in either analysis. The most prominent results pertain to Slovenia and the Slovak Republic. Those two countries appear to be best suited for swift productivity catch-up from the viewpoint of sectoral specialisation. Poland and Estonia exhibit the lowest potentials. Only for the case of Poland would results suggest bleak prospects.

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Keywords: Manufacturing industry, foreign trade specialisation, structural change, productivity growth, productivity gap, transition economies, catch-up

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Project web-site: http://www.iwh-halle.de/projects/productivity-gap

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Introduction

So far, economic theory lacks a coherent modelation of economic development that is able to take into account the role of sectoral specialisation patterns as explanatory factor. It is, however, plain to see that specialisation patterns do play an important role in determining the conditions for economic development. In a rather inductive methodology, we attempt to assess future potentials of backward countries to catch up via real economic integration. The EU accession countries are interesting cases to look at this: some experience with EU integration already exists for earlier waves of enlargement, and the countries in Central East Europe (CEE) are only starting their process of catching up. Structural change is a long-term effect of integration. In particular in post-socialist economies, the structural adjustments effected by integration with the West may take as long as up to 20 or 30 years (see Landesmann / Szekely, 1995).

In our analysis, embedded in a larger international cooperation research project funded by the EU, we assess future prospects of CEECs by trying to determine their potentials for future labour productivity growth (in the following only 'productivity'). We focus on the six most advanced EU accession countries, namely Estonia, Poland, the Czech and Slovak Republics, Hungary and Slovenia (in geographical order). The time of analysis of 1995 and 1998 is particularly interesting: until 1994, the adjustment in the structure of domestic production and in exports to the EU was much less intense than the more profound changes later on. Halpern concluded already in 1995 that major changes were still to be expected after 1994. Our analysis (Stephan, 2003) also suggests that further changes to specialisation are to be expected: after all, specialisation patterns in foreign trade still remain significantly different from the patterns in domestic production as late as in 1998. The process of structural adjustment induced by integration is far from complete in EU accession countries, even after more than one decade of real economy integration.

The analysis uses experience with past integration cases in Europe and a set of intuitive plausibility-assumptions, as well as some simple empirical calculations to carefully determine the relative positions of our six countries in a league table of future prospects of catching up. Some of the analysis draws from results of an earlier study in which future potentials were estimated by use of an empirical model of specialisation in domestic production only. The objective of this study is to refine the results of this prior analysis by incorporating the patterns of specialisation in foreign trade with the EU into the equation.

The paper starts by explaining the intuition behind our hypothesis and the method of analysis. Following a brief description of the available stylised facts on specialisation patterns, the analysis determines the technological sophistication of patterns and the extent of correspondence between the two patterns in domestic production and foreign trade. The paper closes with a qualitative assessment of CEEC's potentials for future manufacturing productivity growth and a short summary with policy conclusions.

1 Patterns of specialisation as determinants of productivity growth

Productivity growth in an economy that is in the process of catching up to higher levels achieved by integration partners depends on a multitude of different determinants: domestic R&D, innovation capacities, the amount and kind of foreign direct investment (FDI), and the like. Until today, however, we lack a coherent theory of economic development which would be able to amalgamate all those determinants into one explanatory framework.[1]

Yet, one characterisation incorporates most of the information contained in productivity-determinants needed to project at least the potentials for future productivity growth: the pattern of specialisation determines the potentials for indigenous technological development (*via* domestic R&D, innovation capacities) and the potentials for technology transfer (*via* FDI). Some intuitively plausible examples in support of our hypothesis: we can safely assume that the larger the share of R&D-intensive production and the larger the share of innovation-intensive economic activity, the larger will be, in the first instance, the extent of R&D-activity and the number of innovations generated. It should be plain to see that higher R&D and innovation intensities typically improve the potentials for technological development and hence productivity growth. What could be considered to be just as important for future potentials for productivity growth, the amount and in particular the character of FDI, as well as the technology-transfer effects are also determined to some extent by the specialisation patterns of the host country: the larger the share of technology-intensive economic activity in the host country, the more will FDI target such production and allow subsidiaries to engage in own R&D and innovation production. Obviously, here, the base for potentials technology transfer is larger than in a scenario where the foreign investor benefits most by taking advantage of mainly lower production costs (*i.e.* extended workbench). Technological spillovers are also potential, i.e. even if FDI is exclusively technology-oriented, the amount of technology transferred still depends on the receptivity or absorptive capacity of the host economy, which again depends of the specialisation patterns of domestic production.

Of course, those plausibility-rules also hold *vice versa*: the more an economy is dominated by labour-intensive production (possibly due to a comparative advantage in low labour costs), the more will FDI and international division of labour take the form of low-wage, low-value added, extended workbench activities. Whilst those are clearly less prone to higher levels of technological sophistication, low-wage comparative advantages are generally the typical

[1] In a small number of singular theoretical works, the effects of particular patterns of specialisation have been linked to prospects for catching up development: e.g. in Snower (1994), a distinct specialisation on low-skill branches is shown to possibly lead into a development trap.

comparative advantage of EU accession states in Central East Europe (CEE). Hence, we assume that structural patterns of specialisation in the manufacturing industries contain the 'necessary critical' amount of information needed to assess potentials for future manufacturing productivity catch-up.

In our analysis, we aggregate 3-digit manufacturing branches into 4 homogeneous and overlap-free classes, each of which being characterised best by a common classifying criterion: the class of labour intensive branches, the class of marketing intensive branches, technology driven branches and such that demand, on average, only low skill levels from personnel engaged in those industries. The share of all branches considered in those four classes amounts to between 70 *per cent* and 90 *per cent* of total manufacturing - sufficiently high shares to assume representativeness.

Of course, the method to work with classes of industrial branches is riddled with the problem that we have to assume that each industry will in fact be homogeneous with respect to the classification criterion. However, if we want to infer how the pattern of specialisation affects productivity growth potentials, we have to use some simplification. We accounted for this problem by using the lowest disaggregation of industries available, *i.e.* 3-digit NACE branches, for calculating the shares and for the classification. This is fortunately possible now with the publication of the new WIFO-taxonomy (Peneder 1999, 2000). A few stylised facts in support of our method: we can observe that in fact, manufacturing branches' productivity levels not only differ across branches in the same country, the same branches across different countries also exhibit comparable deviations from the respective countries' average: each branch typically uses different techniques and technologies in the production of value added that correspond to the respective type of product/production. Hence, in a developed manufacturing sector, each branch achieves a branch-specific productivity level, giving rise to a 'system of relative productivity levels'.[2] This also applies to our four classes of manufacturing. What is even more, this categorisation also holds in terms of growth of branch-specific productivity levels: we can observe a 'system of relative productivity growth rates' relative to each manufacturing branch or class of manufacturing branches. Apparently, some branches lend themselves better to swift productivity convergence than other branches.

2 In particular, both in West and East Europe, the manufacturing branches of *e.g.* 'textiles and textile products', 'leather and leather products', and 'furniture and recycling' typically exhibit productivity levels well below the national average for total manufacturing. Branches like 'coke, refined petroleum products and nuclear fuel', 'chemicals, chemical products and man-made fibres', and 'transport equipment' on the other end of the spectrum are typically situated at the top of the list of branches with respect to their relative productivity levels in total manufacturing. The branches listed at the bottom range of branch-specific productivity levels are typically associated with a high labour intensity and are rather less demanding on the qualification of personnel, whereas branches listed at the top of the range are typically characterised as being more technology and knowledge-driven.

Accepting those assumptions and our methodological approach, prior attempts at estimating the future potentials of productivity growth yielded clear differences between the countries assessed here (Stephan, 2003[3]): the patterns of specialisation in domestic production in the Slovak Republic turned out to be most adept to promise high potentials for productivity catch-up *vis-à-vis* the current EU-average. The country is projected to achieve the highest growth rates of manufacturing productivity growth averaging over 8 *per cent per anno* between 2000 and 2014. The second place in the result-list of our empirical model is shared by Hungary and Slovenia with projected rates averaging nearly 7 *per cent*, closely followed by the Czech Republic's manufacturing sector with nearly 6 *per cent*. Projected potentials for manufacturing productivity growth in Estonia and Poland are much lower with 4 and 3 *per cent per anno* respectively: here, specialisation patterns in domestic production of manufacturing industries appear to be the least suited for swift productivity catch-up (*ibid.*, p. 14).[4]

This analysis, whilst incorporating the productivity growth experience of CEECs between 1994 and 1999, and of Portugal, Greece and Spain for the years between 1973 and 1985 (*i.e.* their own phase of integration into the European common market), however neglected the effects of structural patterns in foreign trade. Should we not expect that the composition of foreign trade will have some notable influence on the potentials of the trading country to catch up in domestic production in terms of productivity? After all, foreign trade, next to FDI, often plays a leading role for growth and technological development in lagging countries catching up by way of real economy integration: exports are already exposed to intense competition (more than domestic production, as here trade barriers like transportation costs, language barriers, *etc.* still apply) and they should "provide a better indication of CEEC comparative advantages" (Tajoli 2000, p. 10). Moreover, domestic demand in lagging countries is typically shallow and relatively less sophisticated in terms of the technology embedded in products; additional demand and demand for more sophisticated produce can however be found on more developed foreign markets. This way, the export sector typically serves as an engine for economic development in terms of quantity and quality ('export-led growth'). Following our intuition, we would expect that the higher the technological sophistication of composition of foreign trade, the more pronounced will be productivity growth-accelerating effects of foreign trade, and *vice versa*.

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3 In particular, this analysis estimated elasticities of our four classes of manufacturing with respect to their role for total manufacturing productivity growth by use of a linear regression model with manufacturing productivity growth as dependent variable and the shares of classes in total manufacturing as explanatory variables. The resulting coefficients for each class, duly interpreted as elasticities, will be used in the present analysis at a later stage.

4 In fact, our prior estimations were conducted for four different scenarios. The results reported here pertain to the first scenario, a dynamic one in which the patterns of specialisation are not constant but evolve according to the trends exhibited in the past. This scenario was deemed to be the most relevant. The other scenarios assume structural convergence to different patterns existing in the current EU and one scenario assumes constant patterns. Those attempts were used to better put results into perspective.

2 Stylised facts on specialisation patterns in foreign trade of CEECs with the EU and in CEEC's domestic production

Following the same method as in the analysis of specialisation of domestic manufacturing, the structures in foreign trade are assessed in terms of relative shares of classes of products. The classes consist once again of homogeneous, non-overlapping 3-digit NACE-industries.[5] Here, the focus is on manufacturing industries: most tradeables are in fact to be found in manufacturing, and trade in (unprocessed) agricultural produce can be expected to be heavily distorted by the effects of European Common Agricultural Policy on prices and volumes. To be able to compare the patterns in domestic production and foreign trade, the same classification criteria, derived from the new WIFO taxonomy (Peneder, 1999, 2000) were applied for foreign trade.

Table 1 provides a picture of respective patterns for the six EU accession countries for the years of 1995 and 1998. Whereas the patterns in domestic production are presented in shares in total employment for the cases of Estonia, Poland, the Czech Republic, and Hungary, and in terms of value added shares for the Slovak Republic and Slovenia, the patterns of foreign trade report value-shares of exports of CEECs to the EU for all CEECs assessed here.[6]

Alike in specialisation patterns of domestic production, specialisation in foreign trade with the EU exhibit high shares of labour intensive industrial branches in excess of 20 *per cent*: in Poland, the share is highest with slightly over 40 *per cent*, in Slovenia and Estonia slightly less than one third of foreign trade with the EU is from manufacturing branches which can be labelled as being typically labour intensive. Whereas this share has fallen between 1995 and 1998 in the case of Slovenia, foreign trade in Estonia and Poland has become even more labour intensive. The lowest shares in labour intensive trade can be found in the Slovak Republic. In our analysis of domestic specialisation patterns and manufacturing productivity growth, we established a negative relationship between the share of labour intensive production and total manufacturing productivity growth with an elasticity of -0.4.

Also of significant weight in trade with the EU are technology driven branches: in the Slovak Republic, more than 40 *per cent* of foreign trade is technology intensive, in Hungary, the share is higher than 30 *per cent*, in the Czech Republic and Slovenia, the shares amount to around a quarter of total EU trade. Those shares, however, have only increased recently: in the Slovak Republic, the share of technology driven trade has increased by a stunning

[5] In the case of foreign trade structures, a correspondence table to translate SITC into NACE was used. The author wishes to express his thanks to Maria-Luigia Seganana from Trento University for her providing the raw data readily translated.

[6] The different way to measure specialisation patterns between countries and domestic production and foreign trade are a sub-optimal solution and will result in some distortions. This, however, is a tribute to very limited data-availability.

Table 1 Patterns of specialisation in foreign trade and in domestic production

		Foreign trade specialisation patterns			Domestic production specialisation patterns		
		1995	1998	1998-1995	1995	1998	1998-1995
Estonia	Labour intensive	29.3	31.4	+ 2.1	34.6	37.5	+ 2.9
	Marketing intensive	25.7	26.3	+ 0.5	28.1	27.3	- 0.8
	Technology driven	2.8	5.8	+ 3.0	8.3	9.0	+ 0.7
	Low-skilled	18.9	12.1	- 6.8	21.0	18.1	- 2.9
Poland	Labour intensive	38.3	40.1	+ 1.8	30.8	30.7	- 0.1
	Marketing intensive	15.3	13.4	- 1.9	26.3	27.8	+ 1.5
	Technology driven	13.5	16.4	+ 2.8	7.6	7.2	- 0.4
	Low-skilled	18.4	14.4	- 4.0	20.9	21.4	+ 0.5
Czech Republic	Labour intensive	27.4	24.3	- 3.1	27.0	28.6	+ 1.6
	Marketing intensive	12.3	8.5	- 3.8	23.1	23.1	+ 0.1
	Technology driven	13.7	25.4	+ 11.7	9.3	10.0	+ 0.7
	Low-skilled	19.5	15.1	- 4.4	16.8	15.4	- 1.4
Slovak Republic	Labour intensive	28.4	20.0	- 8.5	15.3	18.4	+ 3.1
	Marketing intensive	13.7	9.5	- 4.2	21.0	21.0	+/- 0.0
	Technology driven	19.5	41.5	+ 22.0	9.2	11.7	+ 2.5
	Low-skilled	18.2	12.3	- 5.9	25.2	19.1	- 6.1
Hungary	Labour intensive	25.3	25.0	- 0.3	25.6	25.6	+ 0.1
	Marketing intensive	17.5	10.2	- 7.3	30.2	27.1	- 3.1
	Technology driven	24.3	31.9	+ 7.6	9.6	11.7	+ 2.1
	Low-skilled	11.8	6.9	- 4.9	12.4	13.0	+ 0.6
Slovenia	Labour intensive	35.5	31.6	- 3.9	21.9	22.2	+ 0.4
	Marketing intensive	8.0	7.4	- 0.7	27.2	25.7	- 1.5
	Technology driven	20.3	26.1	+ 5.9	15.4	5.9	+ 0.5
	Low-skilled	14.1	12.6	- 1.5	14.4	13.8	- 0.6

Note: Foreign trade specialisation in *per cent* of value of total imports from CEECs to EU, domestic patterns in *per cent* of total employment or value added. Changes between 1995 and 1998 denoted in *percentage* points.

Sources: EUROSTAT (CRONOS), new WIFO taxonomy, own calculations.

22 *percentage* points, and in the Czech Republic by nearly 12 *percentage* points. Only in the case of Estonia (nearly 6 *per cent*) and Poland (slightly more than 16 *per cent*) are technology driven products in EU trade of only minor importance in terms of shares in 1998 and trend since 1995. In this class of manufacturing, our prior analysis established a positive relationship with an elasticity with productivity growth of +0.5.

Marketing intensive branches turned out to be negatively associated with manufacturing productivity growth with an coefficient of -1.6. Foreign trade in products belonging to this class command high shares in Estonia (26.3 *per cent*) only. Also in this country, this share slightly increased, in all other countries, change between 1995 and 1998 in this trade class was negative.

In all countries, trade in products of branches belonging to a manufacturing branch which is less demanding on the qualification of labour (low-skilled class) commands lower shares and is on the retreat. The association between the share of this class and productivity growth in domestic manufacturing turned out to be to the tune of -0.7.[7]

In total, foreign trade does appear to mirror comparative advantages of relatively lower labour costs in EU accession states, which is particularly pronounced in Poland, Slovenia and Estonia. However, the trends in specialisation (low-skilled and labour intensity) between 1995 and 1998 point to a redirection of foreign trade in terms of products exported to the EU. At first glance, the high and even increasing shares of EU trade in technology-driven produce appears to contradict comparative advantage-patterns. This, however, might well be an effect of FDI into EU accession states.[8] In addition, this group of manufacturing commands much higher shares in foreign trade than in domestic production in all countries except Estonia. Low-skilled manufacturing in contrast turns out to be more important in domestic production as compared to domestic trade. Those observations can serve as an indication of the "export-led" hypothesis.

3 The technological sophistication of foreign trade of CEECs with the EU and of CEEC's domestic production

Whilst this description of shares in foreign trade of EU accession states with the EU is informative, it cannot provide an unambiguous picture of specialisation patterns. We need

[7] In terms of possible future patterns of specialisation, the analysis by Tajoli concludes that "we can expect to observe a shrinking of the more traditional and labour intensive sectors and an expansion of the mechanical sectors" (2000, p. 17).

[8] Lacking empirical evidence on the technological contents of FDI into EU accession states, we are unable to test this hypothesis.

some weighting-coefficients to amalgamate the information contained in the shares of the four different groups of products. Our method to assess technological sophistication of foreign trade of CEECs with the EU makes use of the productivity growth elasticities of shares of classes of manufacturing established in our prior analysis for domestic production: were the shares of labour intensive production to rise by 1 *per cent*, our model would predict productivity growth to be lower by 0.4 *per cent*; the elasticities for the share of marketing intensive branches was estimated at -1.6 *per cent*, that for technology driven production +0.5 *per cent* and the elasticity of low-skilled production was estimated to be -0.7 *per cent*. This provides us with the possibility to assess specialisation patterns, to determine whether they are more or less favourable for productivity growth, *i.e.* whether they indicate high or low potentials for future productivity growth. This we denote 'technological sophistication' in the following.

We calculate an indicator of technological sophistication by using those elasticities as weights for the empirical shares in foreign trade (table 2). This results in a purely synthetic indicator that amalgamates all the information contained in foreign trade specialisation patterns of CEECs. The higher the indicator, the more can foreign trade with the EU be considered technologically sophisticated: in 1998, the highest sophistication is indicated for the Slovak Republic and Hungary, followed by Slovenia and the Czech Republic. Poland and Estonia are much lower down the ranks. Whilst all EU accession countries exhibit a trend towards higher sophistication in foreign trade, the Slovak Republic's high value has only emerged recently: in 1995, Slovak foreign trade with the EU was still less technologically sophisticated than *e.g.* that of Hungary of Slovenia. This might indicate once again the leading role of FDI, as such strong re-specialisation of foreign trade would normally only be conceivable in times of selective trade liberalisation. *Vis-à-vis* the EU, this, however, took place in the early 1990s. The trend between 1995 and 1998 shows significant growth of technological sophistication also for Hungary and the Czech Republic, the two countries with the prominently highest shares in FDI into the region.

Table 2 Indicator of technological sophistication of foreign trade

	Estonia	Poland	Czech Republic	Slovak Republic	Hungary	Slovenia
1995	- 64.7	- 46.0	- 37.4	- 36.3	- 34.3	- 26.8
1998	- 60.2	- 39.4	- 21.1	- 11.1	- 15.1	- 20.2
1998-1995	+ 4.5	+ 6.6	+ 16.3	+ 25.2	+ 19.1	+ 6.6

Source: EUROSTAT (CRONOS), new WIFO taxonomy, own calculations.

In total, we can derive from this indicator of technological sophistication, that from the viewpoint of foreign trade specialisation, the Slovak Republic and Hungary are best suited to experience productivity growth in manufacturing industry, whereas Poland and Estonia exhibit the lowest potentials.

The same method was applied for the pattern of specialisation in domestic production of CEEC's manufacturing industries.[9] The indices of technological sophistication of domestic production are provided in table 3: as was to be expected following our assumption of 'export-led development', the values of our indicator are lower than those for EU trade in all countries and for both 1995 and 1998. Moreover, the differences between the countries turn out to be much lower than for EU trade.

Table 3 Indicator of technological sophistication of CEEC domestic production

	Estonia	Poland	Czech Republic	Slovak Republic	Hungary	Slovenia
1995	- 69.4	- 65.3	- 54.8	- 52.7	- 62.4	- 54.7
1998	- 66.9	- 68.2	- 54.2	- 48.8	- 56.8	- 51.8
1998-1995	+ 2.5	- 2.9	+ 0.6	+ 3.9	+ 5.6	+ 2.9

Source: EUROSTAT (CRONOS), new WIFO taxonomy, own calculations.

The highest value of the indicator in 1998, *i.e.* the highest technological sophistication of domestic production, is recorded for the Slovak Republic and Slovenia. The indicator for the Czech Republic and for Hungary is a bit lower, and Estonia and Poland, again, rank at the bottom of the list. The extents of change between 1995 and 1998 are generally much lower in domestic production, the only significant changes can be observed for Hungary and the Slovak Republic. Again, the indicator allows us to assess future productivity growth potentials in manufacturing industries of our selection of EU accession states: from the viewpoint of specialisation in domestic production, the Slovak Republic and (this time) Slovenia are best suited to experience productivity growth in manufacturing industry, whereas Poland and Estonia (again) exhibit the lowest potentials.

We can hence observe some parallel characteristics in the ranking of the countries between foreign trade and domestic production specialisation. We, however, also recorded some differences in specialisation, in particular in trends and the absolute values of our indicator. How do differences in specialisation between foreign trade and domestic production affect productivity growth in manufacturing?

4 Specialisation differences in foreign trade of CEECs with the EU and in CEEC's domestic production

From trade theory and in the relevant literature, it is typically expected that in mature and open market economies, the pattern of specialisation in foreign trade will mirror comparative advantages in the domestic economy and technology differences with the integration area. Furthermore, foreign trade structures will mirror specialisation patterns in domestic production.

[9] Not surprisingly, the resulting grades for specialisation patterns in domestic production compare well with the results of the prior analysis; after all, the elasticities and shares of respective classes in total manufacturing were the same as used in this analysis.

In our post-socialist economies, however, dissimilarity between foreign trade specialisation and domestic production specialisation is significant and even increased between 1995 and 1998 in all countries except Slovenia.[10] Table 4 reports the values of our dissimilarity indicator which is calculated as EUCLID-index of our four classes of manufacturing industries.

Table 4 Difference-indicators of specialisation patterns between foreign trade of CEECs with the EU and in CEEC's domestic production

	Estonia	Poland	Czech Republic	Slovak Republic	Hungary	Slovenia
1995	8.2	14.8	12.0	19.5	19.5	24.0
1998	9.2	20.7	21.7	32.7	27.1	23.0
1998-1995	+ 0.9	+ 5.9	+ 9.7	+ 13.1	+ 7.6	- 1.0

Source: EUROSTAT (CRONOS), new WIFO taxonomy, own calculations.

Apparently, the largest divergences between the two specialisation patterns in the structures of CEEC's exports to the EU and in structures of domestic production exist in the Slovak Republic and Hungary. These, however, only emerged recently: back in 1995, the structural patterns in both countries were much closer than in 1998. Their dissimilarity indices in 1995 were closer also in comparison to Slovenia, albeit here, the patterns of specialisation have converged slightly between 1995 and 1998. Only in Estonia are structural patterns comparable between foreign trade and domestic production, in line with our theoretical expectations.

If, in the 'export-led' concept, technology transfer (from spread effects) is typically most pronounced between comparable (industrial) branches, then one could hypothesise that productivity growth should be fastest, where the pattern of foreign trade specialisation closely mirrors the specialisation displayed by domestic production. This hypothesis was tested empirically.

A correlation analysis was conducted between the EUCLID specialisation indices and manufacturing productivity growth with the aim to determine the sign and strength of the correlation.[11] In fact, our analysis established that there is a statistically significant negative and linear relationship between the EUCLID-indices and productivity growth with a coefficient of

[10] The challenging question for future research is therefore concerned with which of the two distinct patterns of specialisation will prevail: the more labour-intensive and traditionally-oriented pattern of today's domestic production, or the more technology-oriented pattern to be observed in today's foreign trade with the EU. Following our assumption of 'export-led development', we would expect the latter to be dominant.

[11] For the correlations analysis, we chose the non-parametric Spearman-Rho specification: our data cannot be assumed to be normally distributed. However, we wanted to test for significance of our results to make sure that the correlation was not statistically coincidental.

-0.46 (with an error probability of slightly more than 2 *per cent*). The chart below (scatter diagramme) provides a graphical account of this correlation.

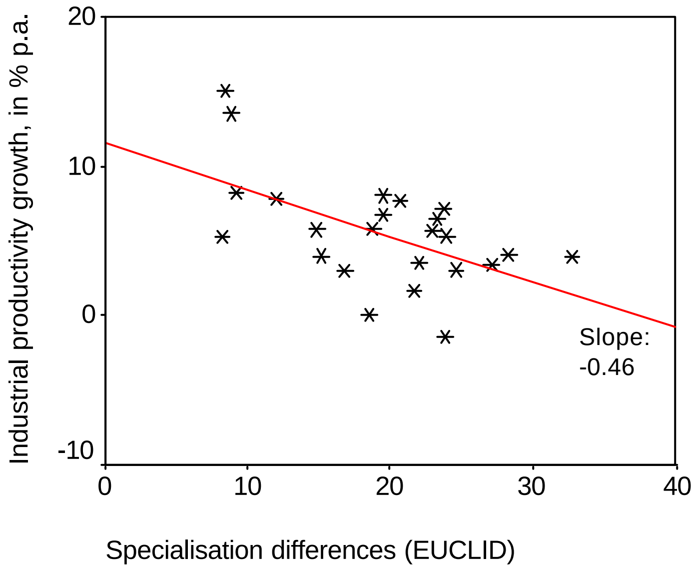

Chart **Correlation of specialisation differences and industrial productivity growth, 1995-1998**

Source: EUROSTAT (CRONOS), new WIFO taxonomy, own calculations.

The above hypothesis was therefore tested positively for our selection of EU accession states for the years of 1995 and 1998: if manufacturing productivity growth in CEECs is in fact driven by exporting, then productivity growth is fastest, where the pattern of foreign trade specialisation closely mirrors the specialisation displayed by domestic production. From this follows that the higher the proximity between the structure of domestic production and of exports, and the faster the convergence of those two structures, the better the prospects for future industrial productivity growth.

If we use the results of this analysis for our attempt to determine the prospects of EU accession states to catch up in terms of manufacturing productivity growth, then we can conclude that productivity growth is likely to be accelerated by proximity and convergence of specialisation patterns in trade and production in the case of Estonia, and decelerated by dissimilarity and divergence of structural patterns in the case of the Slovak Republic, and to a minor extent in Hungary and the Czech Republic.

5 Qualitative assessment of CEEC's potentials for future manufacturing productivity growth

We were able to present some stylised facts of specialisation patterns and attached expectations of their influence on productivity growth potentials to arrive at a variety of three different indicators for productivity growth potentials (tables 2, 3 and 4). Lacking a consistent theory using the information of all three indicators simultaneously, we apply the simple statistical method of rescaling our results to a scale between 0 *per cent* for the lowest values of each indicator and 100 *per cent* for the highest value to make them directly comparable and interpret them as 'grades'. Those three sets of rescaled *percentage* grades are then amalgamated by use of plausible weights[12]: the grades for domestic production structures are weighted with the factor 1, those for foreign trade are weighted by the share of exports in total trade of each country assessed[13], and finally the grades for the structural dissimilarity with the absolute value of the slope of our correlation analysis, *i.e.* 0.46.

Table 5 Ordinal grades for potentials of manufacturing productivity growth transmitted by structural specialisation patterns

		Grades for specialisation ...			Final grades
		in domestic production	in foreign trade	dissimilarity	
EE	1995	0	0	100	15
	1998	7	0	100	16
PO	1995	25	49	58	26
	1998	0	42	51	22
CR	1995	87	72	76	41
	1998	72	80	47	38
SR	1995	100	75	29	35
	1998	100	100	0	39
HU	1995	42	80	29	33
	1998	59	92	24	37
SI	1995	88	100	0	40
	1998	85	82	41	40

Note: The grades are rescaled to a scale between 0 *per cent* for the lowest values of indicators and 100 *per cent* for the highest values. The higher the grades the higher also the indicated manufacturing productivity growth potentials.

Source: EUROSTAT (CRONOS), new WIFO taxonomy, WIIW database, own calculations.

The individual grades and the resulting average grades over all three determinants for each country assessed and in 1995 and 1998 are reported in table 5. Those final results are then compared to the results generated in our prior analysis (Stephan, 2003). The objective of this

[12] Of course, it would have been desirable to use weights endogenously generated from analysis of past experience with EU integration. However, this would necessitate a comprehensive model of the role of sectoral patterns in domestic production, foreign trade and the degree of correspondence between the two. This is however impossible to due to data-restrictions: longer time-series would be necessary to estimate sufficiently robust weights.

[13] The share of exports in total trade is approximated by the share of exports of goods (not services) in total aggregate production. The resulting weight for Estonia amounts to 0.21, that for Poland is much lower at 0.09, for the Czech Republic 0.17, for the Slovak Republic 0.18, for Hungary 0.15, and for Slovenia 0.23 (calculated from national accounts in respective national Statistical Yearbooks).

exercise is to refine the results generated by the analysis of specialisation patterns in domestic production alone to provide a more robust picture of productivity growth potentials determined by specialisation patterns.

After correcting for the influence of foreign trade with the EU and for the influence of the extent of similarity of specialisation patterns between foreign trade and domestic production, the results broadly compare with the results of our prior analysis, indicating the robustness of our methods. However, the order of ranking of our selection of EU accession states turns out to be somewhat different to the results generated in the prior analysis: Estonia and Poland still rank lowest in terms of potentials for manufacturing productivity growth; their gaps to the values of the other countries are however significantly reduced. The highest grades are projected for Slovenia, replacing the Slovak Republic from the first rank in our prior analysis: here, the low rank for the dissimilarity index serves to downgrade the country to second place. Still slightly higher, though, than for the Czech Republic and Hungary. Those latter two countries also switched ranks: in the refined analysis, trends in emerging specialisation patterns play a lesser role than in the prior analysis; Hungary, however, displayed a trend to the advantage of the share of technology driven industries and to the detriment of the shares of mainly marketing intensive industrial branches, the class with the highest -negative- elasticity.

With a view on the dynamics between 1995 and 1998, the probably most prominent result pertains to the drastic fall in the final grade for Poland, further reducing the low projected productivity growth potentials. A slightly less intense fall is recorded for the Czech Republic. In the Slovak Republic and Hungary, the final grade increases equally by 4 *percentage* points, improving our assessments of future prospects.

Summary and policy-conclusions

The objective of this analysis was to refine the results generated in a prior analysis pertaining to a projection of potentials for manufacturing productivity growth measured by specialisation patterns in domestic production only. The refinement of the analysis was attempted by taking into consideration the structural patterns in foreign trade and the similarity of patterns between foreign trade and domestic production. The results of this refined assessment is broadly in line with the results of our prior analysis, yet some slight differences emerged.

In total, our analysis into the patterns of specialisation in domestic production and foreign trade suggests that Slovenia, the country with the highest level of economic development in general and the lowest productivity gap *vis-à-vis* the average EU-15 level amongst all EU accession states, contains the largest potentials for future manufacturing productivity growth. Second in the rank is the Slovak Republic, closely followed by the Czech Republic and Hungary. Poland

and Estonia do not exhibit a just as bleak a prospect as was the case in our prior analysis, yet they still remain at the bottom of the league. What makes things even worse, the analysis also suggests that Poland's prospects have significantly worsened between 1995 and 1998 due to adverse structural change within manufacturing.

In terms of economic policy, it would be tempting to suggest the 'picking of winners' in interventions aimed at structural composition of domestic production and foreign trade. Of course, experience with efficiency and effectiveness of economic policy interventions teaches us that such direct tampering with market results is typically sub-optimal. Rather, economic policy can support and speed up structural adjustment directed by comparative advantages and intensifying integration by way of increasing flexibility. This, however, at the expense of risking that the pattern of specialisation might turn out to be quite disadvantaging for a particular EU accession state. Whilst this might be politically problematic due to the adjustment costs involved (unemployment), this path of development would resemble the so-called 'turnpike-phenomenon', in which the market shifts sectoral structures towards 'less promising patterns' yet fast growth before eventually ending up with 'more promising' structures. This might be particularly relevant in the cases of Poland and the Czech Republic.

A safe policy in this respect could focus on the technological development by means of supporting R&D and the determinants of national innovation systems (see Radoševic 2003). Needless to say, foreign trade policy of the contemporary EU member states *vis-à-vis* the new members should aim at removing the remaining barriers to trade in particular in the 'sensitive' areas.

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